"loose" ossicles, such as *carpals*, *tarsals*, *teeth*, etc. The number of spinal vertebræ, is also variable, but not that of the cranial ones.

The vertebral blocks, as well as the ribs, are the product of the primitive axial series of (intervertebral) discs, which, when completely arrayed, each bear five branches, viz.: two pair of hæmal arches, two pair of neural arches, and a fascicle of parallel cleets, so to speak, which being *cemented* together, both in the front and rear, by the superficial ossification of the discs at either end are fused into the block pieces, as found, *e. g.*, in the young hog; the cementing slab covering the big neural rib head likewise, and not only the pentagonal prismatic block. The first disciform ossification we find in the corals, forming cribrose ethmoidal discs, such as the closely set "sigillate impressions" of the Astraea, and afterwards left behind as the coccyx, *e. g.*, of Cyathophyllum.

On the Earthquake of October, 1870. — By Col. Charles Whittlesey.

The writer confined his attention to what he pronounced the only remarkable feature of the earthquake, which was its occurrence at far distant points almost at the same moment of absolute time. Out of thirty odd observations made at as many different points in the United States, four were known to be accurate to within fifteen seconds, so that the total error could not exceed thirty seconds. Making the necessary allowance for difference of longitude, it occurred at Cleveland, Ohio, at 10 hours 43 minutes 30 seconds; at Albany, New York, 10 hours 43 minutes 9 seconds; at Boston, Mass., at 10 hours 43 minutes and 25 seconds; and at Bangor, Maine, at 10 hours 43 minutes and 19 seconds. The difference, therefore, was only in seconds. The ordinary rate of progression of earthquakes is from twenty to thirty miles an hour; while this one, if it progressed at all, must have moved at the rate of a thousand miles an hour. The paper was intended to raise the question: What kind of an earthquake was it?

Professor McChesney asked whether the author of the paper had given any attention to the subject in connection with the repulsion theories of Dr. Winslow of Boston.

Colonel Whittlesey stated that he had made very little progress toward a theoretical explanation of the phenomenon; he believed, however, that

the earthquake in the case in question was not progressive at all, but that it was produced by some force within the earth, acting outward.

Professor ANDREWS stated that he had observed the earthquake at Columbus, Ohio, and was struck by the fact that the motion, instead of being a sudden shock or jar, as is commonly the case, was like the gentle undulation of a boat in the water. He thought if the earthquake had been the result of a sudden explosion directly beneath, there would have been a sudden jar instead of this undulatory motion. It might possibly be accounted for by the fact that there is a blanket of drift material from eighty to one hundred feet in thickness underlying Columbus, which might serve to break the force of the concussion.

Professor WINCHELL thought the suggestion of Professor Andrews would be applicable to the phenomena in connection with this earthquake, if those phenomena had not had an existence over so wide an area. It seemed incredible that anything like an earthquake wave should have been transmitted from any superficial location along the earth's surface with anything like the rapidity that was indicated.

There must have been a deep-seated force exerted, the results of which reached the surface at remote points nearly at the same time. It would seem to indicate that the seat of earthquake activities is at some point within the earth, far removed from its surface. He thought evidence might possibly be found in this phenomenon, tending to corroborate the theory of some geologists in reference to the fluid condition of the earth's interior, and the comparative thinness of the solid crust upon which the mountains have been reared.

ON THE EXTINCT TORTOISES OF THE CRETACEOUS OF NEW JERSEY. BY PROFESSOR E. D. COPE.

HIS object was to explain two cases of "generalized groups," such as are not common, comparatively speaking, and are of much importance in the history of life. Generalized or synthetic groups of naturalists were explained to be those which combined the characters of others. They were generally found in earlier geologic time, while the more widely differing groups occurred later in time. The cases were as follows. It was explained that the existing division of the marine turtles (*Cheloniidæ*) possess sternal bones united by but few sutures, or with wide intervals; straight humerus and femur, and flat limbs, with truncate finger-bones incapable of flexion. It was shown that the existing snapping tortoises possess a narrow cross-shaped sternum with the bones everywhere united to each other, the femur and humerus curved, and the toes with hinge-jointed phalanges capable of much flexion. It was then pointed out that in the New Jersey Green